Miles D. Grant, Esq. (SBN 89766)
GRANT & ZEKO, APC
1331 India Street
San Diego, CA 92101
Telephone: 619-233-7078
Facsimile: 619-233-7036
E-Mail: mgrant@grantandzeko.com

Attorneys for Plaintiff
PRESIDIO COMPONENTS, INC.

FILED
2007 MAY 17 PM 12:42
CLERK US DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA
BY RM DEPUTY

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

PRESIDIO COMPONENTS, INC.

Plaintiff,

v.

AMERICAN TECHNICAL CERAMICS CORPORATION,

Defendant.

CASE NO. 07CV 0893 J NLS

COMPLAINT AND JURY DEMAND

EXHIBIT A
Page 1

Plaintiff, Presidio Components, Inc. ("PRESIDIO") complains against the Defendant, American Technical Ceramics Corporation ("ATC"), as follows:

JURISDICTION AND VENUE

1. This is an action for patent infringement that arises under the Patent Laws of the United States, Title 35, United States Code. This Court has jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

2. Venue in this Court is based upon 28 U.S.C. §§ 1391(b)-(c) and 1400(b).

THE PARTIES

3. PRESIDIO is a California corporation having its principal place of business at 7169 Construction Court, San Diego, CA 92121.

4. Upon information and belief, ATC is a Delaware corporation having a place of business at 1 Norden Lane, Huntington Station, New York 11746. Upon further information and belief, ATC is, among other activities, engaged in the importation, manufacture, offer for sale and/or sale of ceramic capacitors referred to as "545L." Upon further information and belief, ATC sells and offers for sale ceramic capacitors, including the 545L, either directly or through a distribution network, and has substantial and continuous contacts with this judicial district, and conducts systematic business in this judicial district.

PRELIMINARY ALLEGATIONS

5. PRESIDIO is a leading manufacturer of ceramic capacitors. PRESIDIO's innovative products are offered for sale, and are sold, to customers throughout the United States.

6. The technology used by PRESIDIO in certain of its ceramic capacitors, among other things, is disclosed and claimed in United States Letters Patent No. 6,816,356, entitled "Integrated Broadband Ceramic Capacitor Array" (hereinafter "the '356 patent"), which was duly and legally issued on November 9, 2004. A copy of the '356 patent is attached hereto as **Exhibit 1.**

7. PRESIDIO is the owner by assignment of the '356 patent.

8. On information and belief, ATC has manufactured and sold, and is currently manufacturing and offering for sale, ceramic capacitors referred to as 545L.

FIRST CLAIM FOR RELIEF

(Infringement of U.S. Letters Patent No. 6,816,356)

9. The allegations of paragraphs 1-8 are incorporated herein by reference as though fully set forth herein.

10. On information and belief, ATC has infringed and continues to infringe, and/or induce and/or contribute to the infringement of (collectively, "acts of infringement"), one or more claims of the '356 patent by its manufacture, use, offer for sale, sale and/or importation into the United States, of ceramic capacitors referred to as 545L.

11. On information and belief, the acts of infringement complained of herein are being carried out willfully and with full knowledge by ATC of the '356 patent.

12. As a result of ATC's actions, PRESIDIO has suffered and continues to suffer substantial injury, including irreparable injury, and will result in damages to PRESIDIO, including loss of sales and profits, which PRESIDIO would have made but for the acts infringement by ATC, unless ATC is enjoined by this Court.

PRAYER FOR RELIEF

WHEREFORE, PRESIDIO prays for relief against ATC as follows:

A. That a judgment be entered that ATC has infringed, induced the infringement of, and/or contributed to the infringement of, United States Letters Patent No. 6,816,356;

B. That ATC, its agents, sales representatives, servants and employees, associates, attorneys, parents, successors and assigns, and any and all persons or entities acting at, through, under or in active concert or participation with any or all of them, be enjoined and restrained preliminarily during the pendency of this action and thereafter permanently, from infringing United States Letters Patent No. 6,816,356;

C. That a judgment be entered that ATC be required to pay over to PRESIDIO all damages sustained by PRESIDIO due to such acts of infringement and that such damages be trebled pursuant to 35 U.S.C. § 284 for the willful acts of infringement complained of herein;

D. That this case be adjudged and decreed exceptional under 35 U.S.C. § 285 entitling PRESIDIO to an award of its reasonable attorney fees and that such reasonable attorney fees be awarded;

E. That PRESIDIO be awarded its costs and prejudgment interest on all damages; and

F. That PRESIDIO be awarded such other and further relief as the Court deems just and proper.

JURY DEMAND

PRESIDIO hereby demands and requests trial by jury of all issues raised that are triable by jury.

DATED: May 17, 2007

GRANT & ZEKO, APC

By: ______________________
MILES D. GRANT
Attorneys for Plaintiff
PRESIDIO COMPONENTS, INC.

OF COUNSEL:

Gregory F. Ahrens, Esq.
Brett A. Schatz, Esq.
WOOD, HERRON & EVANS, L.L.P.
441 Vine Street, 2700 Carew Tower
Cincinnati, Ohio 45202-2917
(513) 241-2324 (Telephone)
(513) 241-6234 (Facsimile)

J:\DOCS\16-162\A-Master\Pleadings\Complaint-01.wpd

PATENT ASSIGNMENT

Electronic Version v1.1
Stylesheet Version v1.1

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	NUNC PRO TUNC ASSIGNMENT
EFFECTIVE DATE:	04/14/2003

CONVEYING PARTY DATA

Name	Execution Date
Daniel Devoe	02/05/2008
Alan Devoe	02/05/2008
Lambert Devoe	02/05/2008

RECEIVING PARTY DATA

Name:	Presidio Components, Inc.
Street Address:	7169 Construction Court
City:	San Diego
State/Country:	CALIFORNIA
Postal Code:	92121

PROPERTY NUMBERS Total: 1

Property Type	Number
Patent Number:	6816356

OP $40.00 6816356

CORRESPONDENCE DATA

Fax Number: (513)421-7269
Correspondence will be sent via US Mail when the fax attempt is unsuccessful.
Phone: 513-241-2324
Email: gahrens@whepatent.com
Correspondent Name: Gregory F. Ahrens
Address Line 1: 441 Vine Street
Address Line 2: 2700 Carew Tower
Address Line 4: Cincinnati, OHIO 45202

ATTORNEY DOCKET NUMBER:	DEVOE-45LT-117
NAME OF SUBMITTER:	Gregory F. Ahrens

500457360

PATENT
REEL: 020468 FRAME: 0304

Total Attachments: 3
source=DEVOE_AssignmentPg1#page1.tif
source=DEVOE_AssignmentPg2#page1.tif
source=DEVOE_AssignmentPg3#page1.tif

PATENT
REEL: 020468 FRAME: 0305

ASSIGNMENT OF INVENTION AND PATENTS THEREON

For valuable consideration, we, Daniel Devoe, Alan Devoe and Lambert Devoe, hereby assign *nunc pro tunc*, as of the date of filing of the below-named invention, to Presidio Components, Inc., a Corporation of California and having a place of business at 7169 Construction Court, San Diego, CA 92121, and its successors and assigns (collectively hereinafter called "the Assignee"), our entire right, title and interest throughout the world in the inventions and improvements which are subject of our application for United States Patent filed April 14, 2003 as application Serial No. 10/412,992, entitled INTEGRATED BROADBAND CERAMIC CAPACITOR ARRAY, which issued as U.S. Patent No. 6,816,356, this assignment including said application, and United States patent, and the right to claim priority based on the filing date of said application under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes; and further including all rights and interests to remedies for infringement both past and future; and authorize the Assignee to apply in all countries in our name or in its own name for patents, utility models, and design registrations and like rights of exclusion and for inventors' certificates for said inventions and improvements; and agree for ourselves and our respective heirs, legal representatives and assigns, without further compensation to perform such lawful acts and to sign such further applications, assignments, Preliminary Statements and other lawful documents as the Assignee may reasonably request to effectuate fully this assignment.

IN WITNESS WHEREOF, I hereto set my hand and seal at San Diego, CA,
this 5th day of February, 2008

_____________________ L.S.
Daniel Devoe

STATE OF California :
:ss.
COUNTY OF San Diego :

Before me this 5th day of February 2008, personally appeared Daniel Devoe, a citizen of U.S.A. residing in San Diego, California and particularly at 1106 Barcelona, San Diego, CA 92107, known to me to be the person whose name is subscribed to the foregoing Assignment and acknowledged that s/he executed the same as his free act and deed for the purposes therein contained.

MARGY J. FRENCH
COMM. #1681141
NOTARY PUBLIC • CALIFORNIA
SAN DIEGO COUNTY
Commission Expires July 14, 2010

____
Notary Public

My Commission Expires: July 14, 2010

[Notary's Seal Here]

IN WITNESS WHEREOF, I hereto set my hand and seal at San Diego, CA,
this 5th day of February, 2008

_____________________ L.S.
Alan Devoe

STATE OF California :
:ss.
COUNTY OF San Diego :

Before me this 5th day of February, 2008, personally appeared Alan Devoe, a citizen of U.S.A. residing in La Jolla, California and particularly at 5715 Waverly Avenue, La Jolla, CA 92037, known to me to be the person whose name is subscribed to the foregoing Assignment and acknowledged that s/he executed the same as his free act and deed for the purposes therein contained.

MARGY J. FRENCH
COMM. #1681141
NOTARY PUBLIC • CALIFORNIA
SAN DIEGO COUNTY
Commission Expires July 14, 2010

____
Notary Public

My Commission Expires: July 14, 2010

[Notary's Seal Here]

IN WITNESS WHEREOF, I hereto set my hand and seal at San Diego, CA, this 5th day of February, 2008.

_________________________ L.S.
Lambert Devoe

STATE OF California :
:ss.
COUNTY OF San Diego :

Before me this 5th day of February, 2008, personally appeared Lambert Devoe, a citizen of U.S.A. residing in San Diego, California and particularly at 3446 Stadium Place, San Diego, CA, known to me to be the person whose name is subscribed to the foregoing Assignment and acknowledged that s/he executed the same as his free act and deed for the purposes therein contained.

MARGY J. FRENCH
COMM. #1681141
NOTARY PUBLIC • CALIFORNIA
SAN DIEGO COUNTY
Commission Expires July 14, 2010

Margy J French
Notary Public

My Commission Expires: July 14, 2010

[Notary's Seal Here]

SUPPLEMENTAL DISCLOSURE OF ASSERTED CLAIMS AND PRELIMINARY INFRINGEMENT CONTENTIONS RE: U.S. PATENT NO. 6,816,356

U.S. Patent No. 6,816,356 (Asserted Claims 1-5, 16, 18-19)	ATC 545L Ceramic Capacitor
1. 1. A capacitor comprising:	The ATC545L capacitor is a ceramic capacitor. (*See* Exhibit A1).
a substantially monolithic dielectric body;	The ATC545L capacitor has a monolithic dielectric body. (*See* Exhibit A1).
a conductive first plate disposed within the dielectric body;	The ATC 5454L capacitor has a conductive first plate disposed within the dielectric body. (*See* Exhibit A2).
a conductive second plate disposed within the dielectric body and forming a capacitor with the first plate;	The ATC 545L capacitor has a conductive second plate disposed within the dielectric body and forming a capacitor with the first plate. (*See* Exhibit A2).
a conductive first contact disposed externally on the dielectric body and electrically connected to the first plate; and	The ATC 545L capacitor has a conductive first contact disposed externally on the dielectric body and electrically connected to the first plate. (*See* Exhibit A2).
a conductive second contact disposed externally on the dielectric body and electrically connected to the second plate, and the second contact being located sufficiently close to the first contact to form a first fringe-effect capacitance with the first contact.	The ATC 545L capacitor has a conductive second contact disposed externally on the dielectric body and electrically connected to the second plate (*See* Exhibit A2), and the second contact being located sufficiently close to the first contact to form a first fringe-effect capacitance with the first contact. (*See* Exhibit A3).
2. The capacitor of claim 1 further comprising an insulating layer disposed between the first contact and the second contact on the dielectric body and inhibiting electrical conduction between the first and second contacts.	The ATC545L capacitor includes an insulating layer disposed between the first contact and the second contact on the dielectric body that inhibits electrical conduction between the first and second contacts. (*See* Exhibit A3).
3. The capacitor of claim 1 wherein the first fringe-effect capacitance is disposed on a first side of the dielectric body and the first contact and the second contact are further disposed on a second side of the dielectric body, and the second contact being located sufficiently close to the first contact on the second side of the dielectric body to form a second fringe-effect	The ATC545L capacitor has a first fringe-effect capacitance that is disposed on a first side of the dielectric body (*See* Exhibit A3), and the first contact and the second contact are further disposed on a second side of the dielectric body (*See* Exhibit A2), and the second contact is located sufficiently close to the first contact on the second side of the

U.S. Patent No. 6,816,356 Asserted Claims 1-5, 16, 18-19	ATC545L Ceramic Capacitor
capacitance with the first contact.	dielectric body to form a second fringe-effect capacitance with the first contact (*See* Exhibit A4).
4. The capacitor of claim 3 further comprising:	The ATC545L capacitor. (*See* Exhibit A1).
a first insulating layer disposed between the first contact and the second contact on the first side of the dielectric body and inhibiting electrical conduction between the first and second contacts; and	The ATC545L capacitor has a first insulating layer disposed between the first contact and the second contact on the first side of the dielectric body, and this inhibits electrical conduction between the first and second contacts. (*See* Exhibit A3).
a second insulating layer disposed between the first contact and the second contact on the second side of the dielectric body and inhibiting electrical conduction between the first contact and second contact.	The ATC545L capacitor has a second insulating layer disposed between the first contact and the second contact on the second side of the dielectric body, and this inhibits electrical conduction between the first contact and second contact. (*See* Exhibit A4).
5. The capacitor of claim 3 wherein the first side of the dielectric body and the second side of the dielectric body are substantially parallel.	The ATC545L capacitor has a first side of the dielectric body and the second side of the dielectric body that are substantially parallel. (*See* Exhibit A2).
16. The capacitor of claim 1 wherein the dielectric body is ceramic.	The ATC545L capacitor has a ceramic dielectric body. (*See* Exhibit A1).
18. The capacitor of claim 1 wherein the ceramic body comprises a plurality of ceramic tape layers laminated together in a green ceramic state and fired to form a cured monolithic ceramic structure.	The ATC545L capacitor has a ceramic body that comprises a plurality of ceramic tape layers laminated together in a green ceramic state and fired to form a cured monolithic ceramic structure.
19. The capacitor of claim 1 wherein the dielectric body has a hexahedron shape, the first and second external conductive contacts being positioned on opposed end surfaces of the hexahedron shape.	The ATC545L capacitor includes a dielectric body with a hexahedron shape, the first and second external conductive contacts being positioned on opposed end surfaces of the hexahedron shape. (*See* Exhibit A1).

None of Claims 1-5, 16, or 18-19 is embodied in Presidio Components, Inc.'s products.

441789-1 BSCHATZ

Claims 1, 16, and 18-19 are supported by, and claim priority to, Application No. 10/150,202. Accordingly, Claims 1, 16, and 18-19 are entitled to priority to at least May 17, 2002. Presidio reserves the right to amend this claim of entitlement to priority as warranted by discovery or otherwise.

It is Presidio's contention that all of the above listed claims are literally infringed by ATC's 545L product. Presidio also reserves the right to assert infringement under the doctrine of equivalents, including with respect to the following claim terms: Claim 1: "a conductive first contact disposed externally on the dielectric body" and "a conductive second contact disposed externally on the dielectric body"; Claim 2: "an insulating layer disposed between the first contact and the second contact on the dielectric body"; Claim 4: "a first insulating layer disposed between the first contact and the second contact on the first side of the dielectric body" and "a second insulating layer disposed between the first contact and the second contact on the second side of the dielectric body."

PRESIDIO COMPONENTS, INC.

NEWS RELEASE

Presidio Components, Inc. Sues American Technical Ceramics

Presidio Components, Inc. filed suit on May 17, 2007 against American Technical Ceramics in San Diego, CA, alleging infringement of its U.S. Patent No. 6,816,356. The case relates to ATC's introduction and sale of its Ultra Broadband Capacitor product line 545L series. Presidio Components, Inc. has alleged willful infringement and seeks damages related to capacitors already sold by ATC and an end to all future sales of the 545L series products.

With 4 U.S. patents granted and additional patents pending in broadband capacitor technology, and 26 additional patents in its portfolio, Presidio Components, Inc. is widely recognized as the industry leader in innovative broadband capacitor technology with working frequency from 16kHz to 100GHz.

New services such as video, mobile internet and broadband access will continue to fuel dramatic growth in broadband fiber optic and network infrastructure, and will also result in increasing demand for Presidio's unique broadband capacitor technology; a technology it plans to vigorously defend.

The recent June 18, 2007 announcement that AVX intends to acquire American Technical Ceramics will in no way deter Presidio Components, Inc. from enforcing its intellectual property rights.

June 26, 2007

PRESIDIO COMPONENTS, INC.
7169 Construction Court • San Diego, CA 92121 • (858) 578-9390 • Fax (800) 538-3880 or (858) 578-6225
www.presidiocomponents.com

OUR
PRODUCTS

Buried Single Layer, Microwave, Radio Frequency & Fiber Optic Capacitors
Download Catalog for RF, Microwave & F/O Applications

Buried Single Layer Capacitors
US Patent Numbers: 6,366,443 , 6,542,352 , 6,751,082 , 6,753,218 & 6,917,509
Application Ratings
Capacitor Arrays
Surface Mounts
Available Testing
Additional Information
How to Order
Download Kent Simulator for Single Layer Capacitor Modeling
Consult factory for legacy products and part numbers.

Buried Broadband Capacitors (10kHz-50GHz)
US Patent Numbers: 6,587,327 , 6,816,356 , 6,970,341 & 7,075,776
Other Patents Pending.
Features and Applications
Mounting Methods
Performance Characteristics
Selected Performance Data
Low Frequency Modeled Loss
Insertion Loss Performance Data
S-PARAMETER Data for BB0502X7R104M16VP820 Capacitor
16kHz to 40GHz on fused silica
S-PARAMETER Data for BB0302X7R123M16VP820 Capacitor
130kHz to 40GHz on fused silica
S-PARAMETER Data for BB0805X7R154M16VP221 Capacitor
10kHz to 20GHz on Rogers 4003
S-PARAMETER Data for BB0603X7R154M16VP221 Capacitor
10kHz to 20GHz on Rogers 4003
S-PARAMETER Data for BB0502X7R104M16V820 Capacitor
16kHz to 15GHz on ICM fixture
S-PARAMETER Data for BB0502NPO821M16VP1R0 Capacitor
10MHz to 40GHz on fused silica
S-PARAMETER Data for BB0502X7R123M16VP820 Capacitor
130kHz to 40GHz on fused silica
S-PARAMETER Data for BB0502Y5V224M16VP8205 Capacitor
7kHz to 40GHz on fused silica
Eye Diagram Comparison 10GBits/Sec: MBB0502X104MGP DC Block versus 0402X7R100pF DC Block
How to Order

Equivalent Circuit Models
(provided by Modelithics) Modelithics

"VL" Series - Vertical Layer Capacitors

ESR and ESL Measurements of MVL3030Y 100nF

"VB" Series - Integrated Broadband Bypass Capacitors

US Patent Numbers: 6,587,327 , 6,816,356 , 6,970,341 & 7,075,776
Other Patents Pending.

S-PARAMETER Data Available for Download

Available Testing
Part Number Definitions
Catalogs/Quotes/Info
Full Product Line

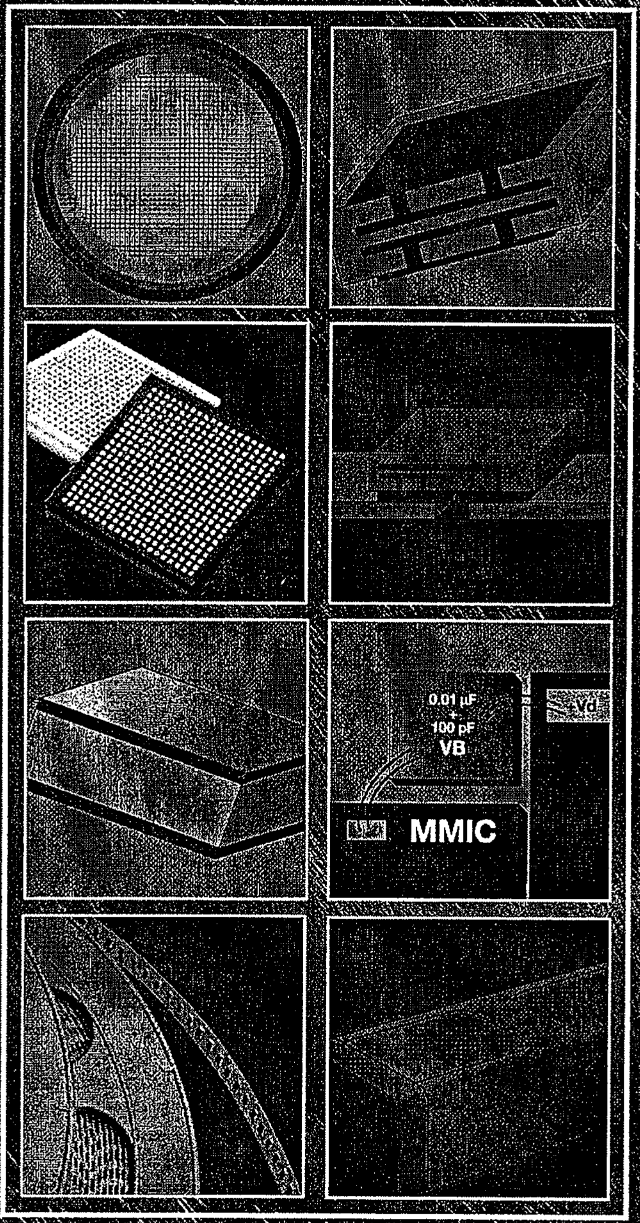
All our products feature wide capacitance ranges available in many popular sizes. See individual product pages for detailed capacitance specifications, or call one of our sales representatives for additional sizes.

Home | Sitemap | Products | Sales | Request Info | Contact

Copyright 1998-2008 Presidio Components, Inc.

PRESIDIO COMPONENTS, INC.

CERAMIC CAPACITORS FOR RF, MICROWAVE & E/O APPLICATIONS



BURIED SINGLE LAYER
SMT BURIED SINGLE LAYER
INTEGRATED BROADBAND
BURIED BROADBAND

PRESIDIO COMPONENTS, INC.

HIGH PERFORMANCE, HIGH RELIABILITY CERAMIC CAPACITORS

BURIED SINGLE LAYER™ CAPACITORS, WIRE BONDABLE AND SURFACE MOUNT

About Presidio

Presidio Components has been an industry leader in the manufacture of ceramic capacitors since 1980. We are dedicated to excellence in manufacturing, process control and customer service. All products are manufactured and tested in our state-of-the-art, 40,000 square foot facility in San Diego, California, allowing for immediate response to your business needs. We have numerous patents, and hundreds of years of combined engineering experience, and we can formulate the right product for your application.

"V" SERIES — INTEGRATED BROADBAND BYPASS AND VERTICAL LAYER CAPACITORS

Testing & Reliability

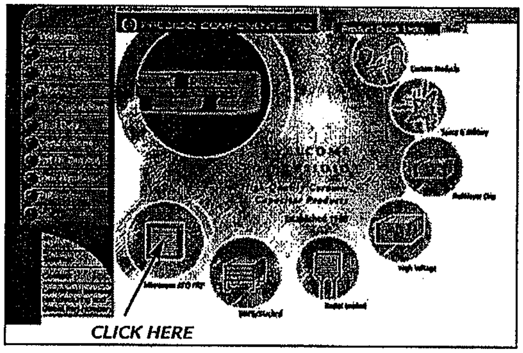
Presidio Components was initially qualified to Mil-PRF-55681 in 1984. Since then we have upgraded our processing line to obtain the highest established reliability of 'S' level. We are also qualified on two additional space level applications, Mil-PRF-123 and Mil-PRF-49470 'T' level. Presidio Components is also proud to be the first QPL supplier to Mil-PRF-49467, the high voltage ceramic capacitor specification. All QPL testing per Mil-STD-202 is done on site at our DSCC approved test lab. For a list of environmental test capabilities, consult the factory.

BURIED BROADBAND™ CAPACITORS

Quality & Customer Service

At Presidio Components we work hard to build positive, long-term relationships with our customers and we will go the extra distance to ensure customer satisfaction. If you cannot find a part anywhere else, call Presidio Components. With more than 70 million parts in inventory, we have many commercial and military parts in stock. Our patented ceramic capacitors are typically used in low noise, filter, tuning, broadband DC blocking, and RF bypass applications.

For more information about Presidio's products visit our website at: www.presidiocomponents.com



Presidio's Website Home Page

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

BURIED SINGLE LAYER™ CAPACITORS

PRESIDIO ADVANTAGE

- Presidio's patented thick film technology buries electrodes into the ceramic body (Fig. 1) allowing a 10:1 advantage over a conventional construction (Fig. 2). It offers the designer: (a) more bandwidth through increased device capacitance, (b) more stable capacitance over temperature and (c) more capacitance in smaller case sizes for increased board density.

  Filled vias connect the buried electrodes with the outside top and bottom metallization pads; 99.99% pure Au is standard for all metal connections allowing proven wire bond techniques with AuSn or conductive epoxy die attach techniques.

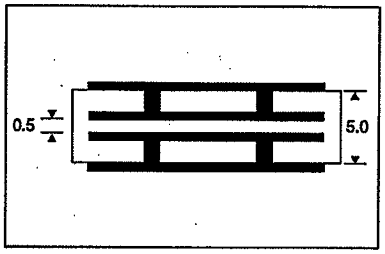


Fig. 1. Construction of buried electrodes

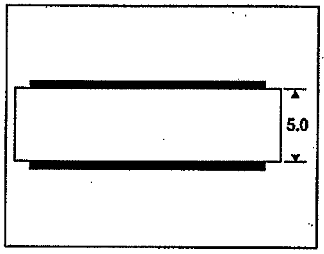


Fig. 2. Standard Single Layer Capacitor

- Excellent low loss performance for high Q applications as demonstrated with a 10 pF NPO capacitor shown in Fig. 6 below.
- Ease of dielectric material selection: Presidio offers 3 ceramic materials while most other suppliers offer more than 15.
- RoHS compliant.

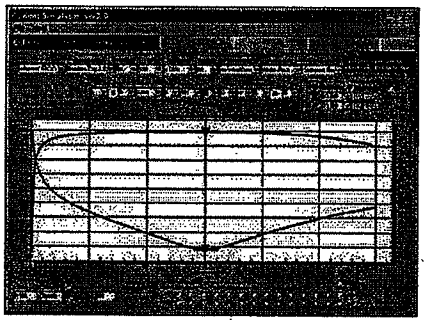


Fig. 3. Kent Simulator Version 2.0: LSA1010B101MGH5R-

KENT SIMULATOR

Using the KENT SIMULATOR (Fig. 3), a designer can obtain commonly needed RF capacitor parameters in graphical format for popular Presidio Components RF capacitors. In addition, S-parameters for selected capacitors can be saved in S2P format. All device parameters are derived from a series transmission line model developed by Dr. Gordon Kent and available at *www.presidiocomponents.com.* A technical discussion of the simulation used in the Kent Simulator is presented by Gordon Kent in the "Summary of the Capacitor Simulator."

TYPICAL APPLICATIONS

FILTER CAPACITOR

A filter design requires a specific capacitance value, C_F and at the upper end of the filter response, f_F, the effective capacity must not exceed C_F by more than a specified amount of ΔC. Once C_F is determined, case size, voltage rating and temperature characteristics can be selected. Typically, lower loss Class I materials like NPQ and NPO are first choice. See Fig. 4.

RESONANCE-FREE BROADBAND COUPLING/DECOUPLING CAPACITOR

Class II "BX" dielectric is typical for DC block or RF bypass applications to operate resonance free over a specified broad frequency range. Low impedance is typically more important than the capacitance value which should be large enough to cover the 3 dB low edge of the bandwidth. See Fig. 5.

MINIMUM LOSS, FINITE BAND COUPLING CAPACITOR

When minimum loss is required, e.g. a low noise circuit, a high Q capacitor with Class I dielectric (NPQ or NPO) is recommended. Any parallel resonance frequency of the capacitor should be outside of the use frequency band. The best capacitor choice puts the series resonance at the band center (approximately f_0 / 2). See Fig. 6.

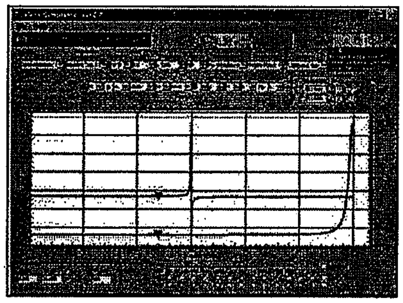


Fig. 4. Modeled ESR/50 and Ceff of part NSA2525N6R8K2H5R-

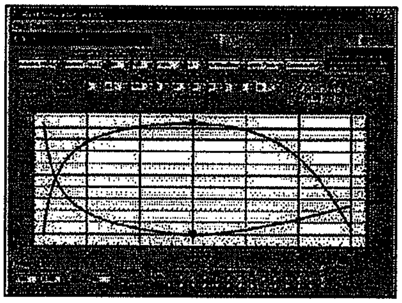


Fig. 5. Modeled S21 and Z/50 of part LSA1010B101MGH5R-, Class II dielectric

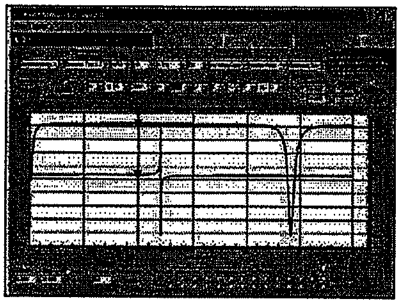


Fig. 6. Modeled S21 and Ceff of part NSA3030N100J2H5R-, Class 1 dielectric

PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

INDUSTRIAL RATING; FIT CALCULATION USING 65°C CONTINUOUS OPERATING TEMPERATURE*

Dielectric Material	Q	Temperature Coefficient	D.W. VDC	Working VDC	Value (pF)	SIZE 1010 1020	SIZE 1212 1224	SIZE 1515 1530	SIZE 1717 1734	SIZE 2020 2040	SIZE 2222 2244	SIZE 2525 2550	SIZE 2727 2754	SIZE 3030 3060	SIZE 3535
NPQ	Highest	0 ± 25 ppm/C	250	100	Min. Max.	— —	— —	0.1 1.5	0.2 1.8	0.2 2.7	0.2 3.0	0.3 3.6	0.3 3.9	0.6 6.8	0.8 9.1
			125	50	Min. Max.	0.5 0.7	0.8 1.0	1.8 2.2	2.0 2.7	3.0 3.9	3.3 4.3	3.9 5.1	4.3 5.6	7.5 9.1	10 12
			62.5	25	Max.	0.8	1.2	2.4	3.0	4.3	4.7	5.6	6.2	10	15
			40	16	Max.	0.9	1.5	2.7	3.6	4.7	5.1	6.2	6.8	12	18
			25	10	Max.	1.3	2.0	3.9	5.1	6.8	7.5	9.1	10	18	24
NPO	High	0 ± 30 ppm/C	250	100	Min. Max.	— —	— —	0.6 4.7	0.7 5.6	1.0 8.2	1.2 9.1	1.5 10	1.5 12	2.4 20	3.3 30
			125	50	Min. Max.	1.5 2.2	2.4 3.3	5.1 6.8	6.2 8.2	9.1 10	10 12	12 15	15 18	22 30	33 43
			62.5	25	Max.	2.4	3.9	7.5	10	12	15	18	20	33	47
			40	16	Max.	2.7	4.3	8.2	12	15	18	20	22	39	56
			25	10	Max.	3.9	6.2	12	15	22	24	30	33	56	75
BX	Broadband DC Block or RF Bypass	± 15%	250	100	Min. Max.	— —	— —	15 150	18 180	22 240	24 270	30 330	33 360	51 620	75 910
			125	50	Min. Max.	6.2 68	10 100	180 200	200 270	270 360	300 390	360 470	390 560	680 910	1000 1200
			62.5	25	Max.	82	120	240	300	390	430	620	750	1000	1500
			40	16	Max.	100	150	270	360	510	620	820	1000	1200	1800
			25	10	Max.	120	180	330	430	560	750	1000	1200	1500	2200

MILITARY RATING; FIT CALCULATION USING 85°C CONTINUOUS OPERATING TEMPERATURE*

Dielectric Material	Q	Temperature Coefficient	D.W. VDC	Working VDC	Value (pF)	SIZE 1010 1020	SIZE 1212 1224	SIZE 1515 1530	SIZE 1717 1734	SIZE 2020 2040	SIZE 2222 2244	SIZE 2525 2550	SIZE 2727 2754	SIZE 3030 3060	SIZE 3535
NPQ	Highest	0 ± 25 ppm/C	250	100	Min. Max.	— —	— —	0.1 1.0	0.2 1.2	0.2 1.8	0.2 2.0	0.3 2.4	0.3 2.4	0.6 4.3	0.8 6.2
			125	50	Min. Max.	0.3 0.5	0.5 0.8	1.2 1.5	1.5 1.8	2.0 2.7	2.2 3.0	2.7 3.6	2.7 3.9	4.6 6.8	6.8 9.1
			62.5	25	Max.	0.6	0.9	1.8	2.2	3.3	3.6	4.3	4.7	7.5	10
			40	16	Max.	0.7	1.0	2.2	2.7	3.9	4.3	5.1	5.6	9.1	12
			25	10	Max.	0.8	1.2	2.4	3.0	4.3	4.7	5.6	6.2	10	15
NPO	High	0 ± 30 ppm/C	250	100	Min. Max.	— —	— —	0.6 3.0	0.7 3.9	1.0 5.6	1.2 5.6	1.5 6.8	1.5 7.5	2.4 12	3.3 20
			125	50	Min. Max.	1.0 1.5	1.5 2.4	3.3 4.7	4.3 5.6	6.2 8.2	6.2 9.1	7.5 10	8.2 12	15 20	22 30
			62.5	25	Max.	1.8	2.7	5.6	6.8	9.1	10	12	15	24	36
			40	16	Max.	2.2	3.3	6.8	8.2	10	12	15	18	30	43
			25	10	Max.	2.4	3.9	7.5	10	12	15	18	20	33	47
BX	Broadband DC Block or RF Bypass	± 15%	250	100	Min. Max.	— —	— —	15 82	18 100	22 150	24 200	30 270	33 330	51 390	75 560
			125	50	Min. Max.	6.2 47	10 75	91 100	120 150	180 220	220 270	300 360	360 430	430 560	620 820
			62.5	25	Max.	56	91	120	180	240	330	430	510	680	1000
			40	16	Max.	68	100	150	220	300	390	510	620	820	1200
			25	10	Max.	82	120	180	240	330	470	560	680	910	1500

SPACE/MILITARY RATING; FIT CALCULATION USING 100°C CONTINUOUS OPERATING TEMPERATURE*

Dielectric Material	Q	Temperature Coefficient	D.W. VDC	Working VDC	Value (pF)	SIZE 1010 1020	SIZE 1212 1224	SIZE 1515 1530	SIZE 1717 1734	SIZE 2020 2040	SIZE 2222 2244	SIZE 2525 2550	SIZE 2727 2754	SIZE 3030 3060	SIZE 3535
NPQ	Highest	0 ± 25 ppm/C	250	100	Min. Max.	— —	— —	0.1 0.5	0.2 0.6	0.2 0.9	0.2 1.0	0.3 1.2	0.3 1.2	0.6 2.2	0.8 3.0
			125	50	Min. Max.	— —	0.1 0.5	0.6 1.0	0.7 1.2	1.0 1.8	1.2 2.0	1.5 2.4	1.5 2.4	2.4 4.3	3.3 6.2
			62.5	25	Max.	—	0.8	1.5	1.8	2.7	3.0	3.6	3.9	6.8	9.1
			40	16	Max.	—	0.9	1.8	2.2	3.3	3.6	4.3	4.7	7.5	10
NPO	High	0 ± 30 ppm/C	250	100	Min. Max.	— —	— —	0.6 1.5	0.7 2.0	1.0 2.7	1.2 3.0	1.5 3.6	1.5 3.9	2.4 6.8	3.3 10
			125	50	Min. Max.	— —	0.6 1.5	1.8 3.0	2.2 3.9	3.0 5.6	3.3 5.6	3.9 6.8	4.3 7.5	7.5 12	12 20
			62.5	25	Max.	—	2.4	4.7	5.6	8.2	9.1	10	12	20	30
			40	16	Max.	—	2.7	5.6	6.8	9.1	10	12	15	24	36
BX	Broadband DC Block or RF Bypass	± 15%	250	100	Min. Max.	— —	— —	15 47	18 62	22 82	24 91	30 100	33 120	51 200	75 300
			125	50	Min. Max.	— —	6.2 56	51 82	68 100	91 150	100 180	120 270	150 330	220 430	330 620
			62.5	25	Max.	—	75	100	120	180	270	330	390	470	680
			40	16	Max.	—	82	120	150	270	330	390	430	750	1000

*** Rated temperature range from -55°C to 125°C applies to NPQ, NPO and BX materials**

PRESIDIO COMPONENTS, INC.

www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 19

GLOBAL PART NUMBER EXAMPLE (How to Order)

L S A 1515 B 101 M 3 H 5 R — A

[redacted]

Testing Codes

Presidio Components' quality system is ISO 9001 compliant and approved to Mil-I-45208 and Mil-Std-790

Code Description

L Industrial Rating, 65°C Continuous Operating Temperature
Electrical: 100% capacitance and dissipation factor (DF), AQL Level II 1% per ANSI/ASQ Z1.4 for insulation resistance (IR) and dielectric withstanding voltage (DWV)
Visual: 100%, as per Mil-Std-883, Method 2032
Can be upgraded to test code H as per Mil-PRF-38534

M Military Rating, 85°C Continuous Operating Temperature
Electrical and visual testing same as L code
Can be upgraded to test codes H and K as per Mil-PRF-38534, and as per Mil-PRF-49464/B, Group A and B testing @ 125°C

N Space/Military Rating, 100°C Continuous Operating Temperature
Electrical and visual testing same as L code except 100% insulation resistance and dielectric withstanding voltage. Can be upgraded to test codes H and K as per Mil-PRF-38534, and as per Mil-PRF-49464/B, Group A and B testing

Mil-PRF-38534E

H Class H element evaluation (electrical, visual, wire bond)
K Class K element evaluation (electrical*, visual, temperature cycling, voltage conditioning, constant acceleration, wire bond)

High Reliability Testing as per Mil-PRF-49464/B Modified—Moisture Resistance Test not Included

A Group A, subgroups 1,2,3,4 (100% thermal shock and voltage conditioning, visual mechanical, bond & die shear, temperature coefficient)
B Group B, subgroups 1,2,3,4 (temperature coefficient and immersion, resistance to soldering heat, humidity, steady state, low voltage, and 2000 hours life test)

D Special Instructions or as per Customer Source Control Drawing

* **Note:** Includes 100% testing: Capacitance, Dissipation Factor, Insulation Resistance and Dielectric Withstanding Voltage

Product Code

S = Buried Single Layer™ Ceramic Capacitor

Termination Configuration Codes

Code	Description
A	Borders top and bottom
B	Borders top, full metallization at bottom
C	Fully metalized top and bottom

Recommended: A: Standard; B: High Reliability AuSn; C: Millimeterwave

Dimensions

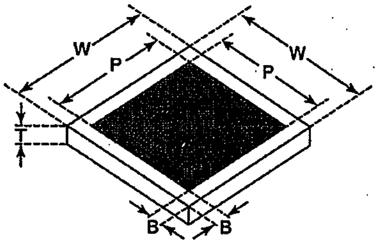
INCHES

Size	Width	Tolerance	Thickness	Tolerance	Nominal P	Minimum B
[redacted]						

MILLIMETERS (reference only)

Size	Width	Tolerance	Thickness	Tolerance	Nominal P	Minimum B
[redacted]						

Maximum thickness limits may not apply for values below 1.0 pF



Capacitance Codes

First two digits = Significant figures of capacitance in picofarads
Third digit = Additional number of zeros
Example: 0R1 = 0.1 pF
1R0 = 1.0 pF
100 = 10 pF
101 = 100 pF

Capacitance Tolerance Codes

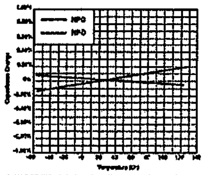
Code	Tolerance	Cap Range	Dielectrics
A	± .05 pF	< 2.2 pF	NPQ, NPO
B	± .1 pF	< 10 pF	NPQ, NPO
C	± .25 pF	< 10 pF	NPQ, NPO
D	± .5 pF	< 10 pF	NPQ, NPO
G	± 2%	> 9.1 pF	NPQ, NPO
J	± 5%	> 9.1 pF	NPQ, NPO
K	± 10%	> 0.45 pF	all
M	± 20%	> 0.45 pF	all
P*	+100, -0%	> 0.45 pF	all

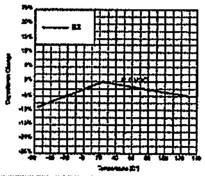
* Does not apply for the highest cap value per case size and voltage rating.

Dielectric Material Codes and Electrical Specifications

Dielectric Material	Code	Relative Er at 1 MHz	Temperature Coefficient -55°C to +125°C	Maximum Dissipation Factor	Insulation Resistance at 25°C	Dielectric Withstanding Voltage (DWV)
NPQ	Q	27	0 ± 25 ppm	0.1%	> 10⁵ MΩ	2.5 times
NPO	N	85	0 ± 30 ppm	0.15%	> 10⁵ MΩ	working voltage
BX	B	2600	± 15%	2.5%, 3.5%, 5.0%*	> 10⁵ MΩ	DC

Notes: Aging Rate: BX material only = 2.5% max per decade hour
All testing as per Mil-C-49464/B with the exception of moisture resistance, unless otherwise specified
* Voltage ratings applicable to: 2.5% = 100V and 50V, 3.5% = 25V and 16V, 5.0% = 10V





Working Voltage

Code	WVDC
3	100
2	50
1	25
G	16
E	10

See standard available capacitance values and voltage ratings on page 4. Contact Presidio Components for higher and lower voltage ratings.

BURIED SINGLE LAYER™ CAPACITORS

PRESIDIO COMPONENTS, INC.

www.presidiocomponents.com • info@presidiocomponents.com

GLOBAL PART NUMBER EXAMPLE (How to Order, continued)

L S A 1515 B 101 M 3 H 5 R — A

[redacted]

Termination Codes				
Code	**Material**	**Thickness**	**Wire**	**Attachment**
H	99.99% Au	100 min.	Au	Conductive Epoxy
J	99% Au Alloy	microinches	Al or Au	or AuSn

Packaging Codes

Code	Description
5	Waffle Pack, 400 max/waffle
F	Grip Ring (blue tape)
1	Tape and Reel (minimum size 2020)

Mechanical Parameters

Bond Strength	Mil-Std-883, Method 2011, Condition D
Shear Strength	Mil-Std-883, Method 2019
Metalization Thickness	100 microinches (2.5 µm)

Environmental Parameters Per Mil-PRF-49464 (when specified)

	Mil-Std-202	Conditions
Immersion	104	B
Resistance to Solder Heat	210	C
Thermal Shock	107	A
100 Hour Voltage Conditioning	108	A
2000 Hour Life Test	108	F
Low Voltage Humidity	103	A

100% Visual Screening as per Mil-Std-883 Method 2032
When inspected under 7X - 30X magnification, capacitors will be uniform in quality and free from pits, cracks, adhered foreign material and other defects which will affect life or serviceability. There will be no demetalization (lift-off, blisters or roll back), voids or scratches on the electrodes which expose the dielectric over more than 5% of the area.

Capacitance and Dissipation Factor Measurements Applicable to measurements under 20,000 pF

(1) **Equipment:**
LCR Meters HP4278A
In-house designed test fixtures

(2) **Procedures:**
BX: 1 KHz, 1 Volt AC RMS, 25°C
NPO, NPQ: 1 MHz, 1 Volt AC RMS, 25°C

(3) **Frequency (beyond 1 MHz):**
High Frequency measurements up to 50 GHz conducted by Modelithics, Inc.

CAPACITANCE VALUE DECADE TABLES

[redacted]

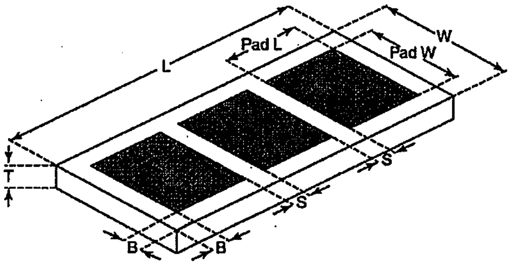
For Design Kits
(20 Capacitors Each Value)
Visit our website
www.presidiocomponents.com

CAPACITOR ARRAYS

Multiple RF Bypass Capacitors for GaAs IC's

Specifications

Termination Configuration:	A (Top and Bottom)
Termination Code:	H (Conductive Epoxy or AuSn)
Temperature Coefficient:	BX (± 15%)
Temperature Range:	– 55°C to +125°C
Standard Capacitance:	130 pF per pad @ 25°C
Capacitance Tolerance:	± 25%
Capacitance Value:	Calculated only, not measured
Working Voltages:	25 and 50 VDC
Dielectric Withstanding Voltage:	62.5 and 125 VDC



GLOBAL PART NUMBERS

Working VDC	Size	pF	# of Pads	W ± .003 (inches)	L (inches)	T ± .002 (inches)	P Norm. Pad W/L (inches)	B Min. Border (inches)	S Norm. Spacing (inches)	Part Number
[redacted]										

* Insert Design-In Code from Page 16.

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 21

SURFACE MOUNT BURIED SINGLE LAYER™ CAPACITORS

PRESIDIO ADVANTAGE

- Alternative to wirebondable capacitors for coupling on a microstrip (Fig. 1 & 2) or as bypass capacitor on coplanar waveguides (Fig. 3)
- Elimination of additional impedance caused by wire bonding
- Minimum discontinuity in circuit elements
- **Select capacitance values and voltage ratings from charts on page 4**
- **Use Kent Simulator for modeling**
- RoHS compliant (except with 'N' termination)

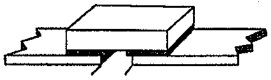


Fig. 1
Microwave

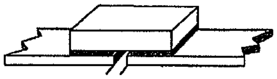
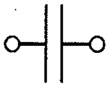


Fig. 2
Millimeterwave



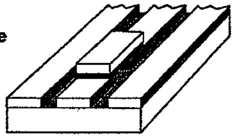


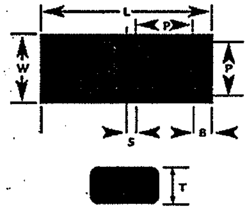
Fig. 3
Coplanar Waveguide

GLOBAL PART NUMBER EXAMPLE (How to Order)

L Q D 1020 B 101 M G H 5 R — A

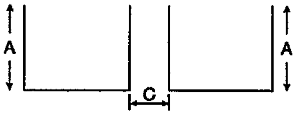
[redacted]

Termination Configuration		
Code	**Description**	**Attachment**
D	Bottom side only	Conductive Epoxy or AuSn
E	Termed and Plated	Solder Attach



Termination			RoHS	
Code	**Description**	**Configuration**	**Code**	**Compliant**
H	99.99% Au	D	R	Yes
N	90/10 Tin/Lead over Ni, Term.	E	N	No
T	100% Tin	E	R	Yes
P	Palladium Silver	E	R	Yes

Packaging Codes	
Code	**Description**
5	Waffle Pack
1	Tape & Reel (Call Factory)



Recommended Mounting Pads

Dimensions — INCHES

Size	Width W	Length L	Thickness T	Nominal P	Min. B	Nominal S	Not Specified Tol.
[redacted]							

MILLIMETERS (reference only)

[redacted]

INCHES

Size	Min. A	Min. C
[redacted]		

MILLIMETERS (reference only)

[redacted]

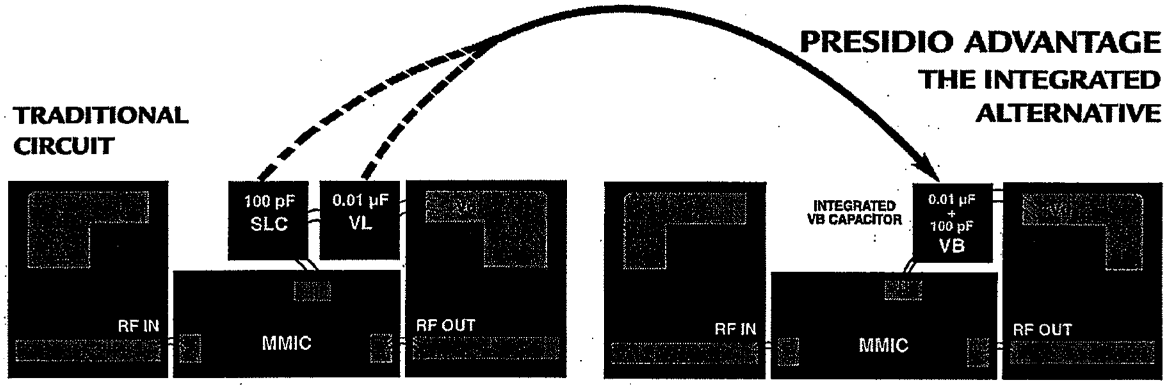
PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 22

"VB" SERIES
INTEGRATED BROADBAND BYPASS CAPACITORS

10 nF or 100 nF DC Filter with Buried RF Capacitors Inside



PRESIDIO ADVANTAGE
THE INTEGRATED ALTERNATIVE
TRADITIONAL CIRCUIT
100 pF SLC
0.01 µF VL
RF IN
MMIC
RF OUT
INTEGRATED VB CAPACITOR
0.01 µF + 100 pF VB
RF IN
MMIC
RF OUT

Patent Numbers
US 6,587,327 B1 & US 6,816,356 B2
Other Patents Pending

POPULAR CAPACITANCE VALUES, CASE SIZES AND PART NUMBERS

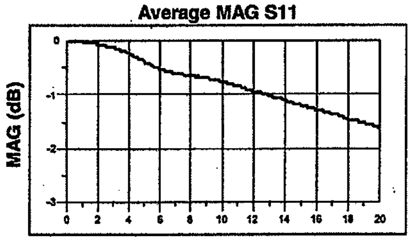
Cap. + Tol.	Size	Temp. Coefficient	WVDC	Global Part Numbers
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

For Dimensions See Page 10
*Insert Design-In Code (See Page 16)

PERFORMANCE: MVB3030X103ZGH5N1_*_ (Bond Wires De-Embedded)

Insertion Loss Data in Shunt

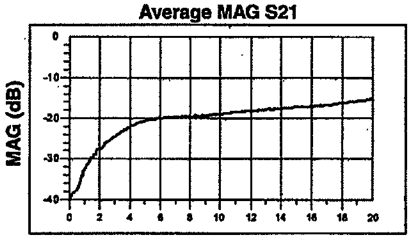
Average MAG S11



MAG (dB)
0
-1
-2
-3
0 2 4 6 8 10 12 14 16 18 20

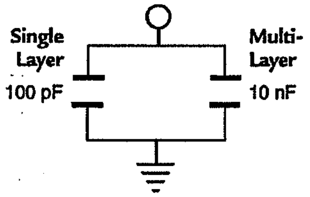
Freq. GHz

Average MAG S21



MAG (dB)
0
-10
-20
-30
-40
0 2 4 6 8 10 12 14 16 18 20

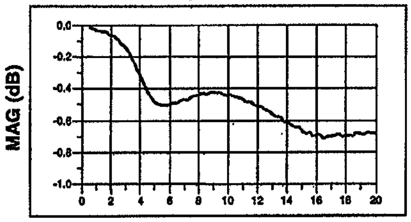
Freq. GHz



Single Layer
100 pF
Multi-Layer
10 nF

PERFORMANCE: MVB4080X104ZGH5R3_*_ (Bond Wires Included)

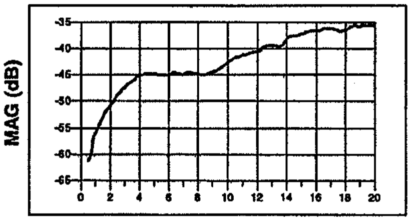
Average MAG S11



MAG (dB)
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
0 2 4 6 8 10 12 14 16 18 20

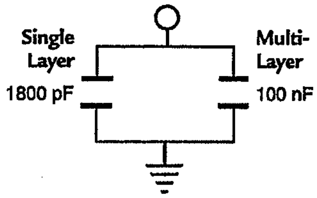
Freq. GHz

Average MAG S21



MAG (dB)
-35
-40
-45
-50
-55
-60
-65
0 2 4 6 8 10 12 14 16 18 20

Freq. GHz



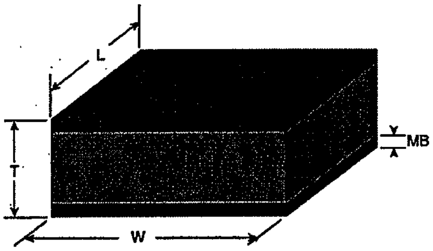
Single Layer
1800 pF
Multi-Layer
100 nF

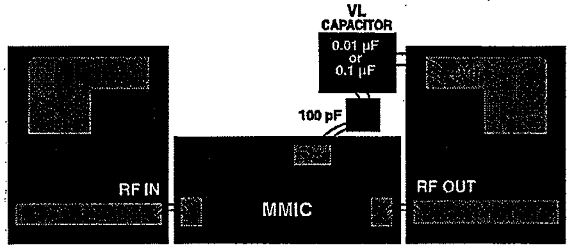
PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 23

"VL" SERIES
VERTICAL LAYER CAPACITORS

Wire Bondable DC Decoupling Capacitors





VL
CAPACITOR
0.01 μF
or
0.1 μF
100 pF
RF IN
MMIC
RF OUT

POPULAR CAPACITANCE VALUES, CASE SIZES AND PART NUMBERS

INDUSTRIAL RATING

RoHS Compliant	Cap. + Tol.	Size	Temp. Coeff.	WVDC	Global Part Numbers
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SPACE/MILITARY CLASS K RATING

RoHS Compliant	Cap. + Tol.	Size	Temp. Coeff.	WVDC	Part Number
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

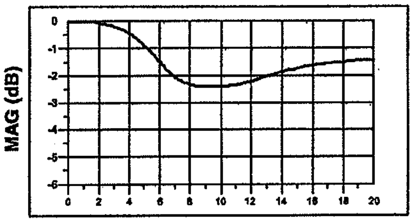
For Dimensions See Page 10

*Insert Design-In Code (See Page 16)

PERFORMANCE: MVL3030X103MGH5N–_*_ (Bond Wires Included)

Insertion Loss Data in Shunt

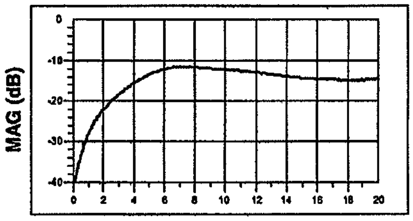
Average MAG S11



MAG (dB)
0
-1
-2
-3
-4
-5
-6
0 2 4 6 8 10 12 14 16 18 20

Freq. GHz

Average MAG S21

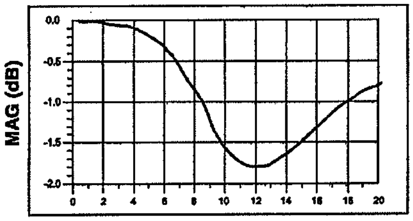


MAG (dB)
0
-10
-20
-30
-40
0 2 4 6 8 10 12 14 16 18 20

Freq. GHz

PERFORMANCE: MVL4080X104MGH5N–_*_ (Bond Wires Included)

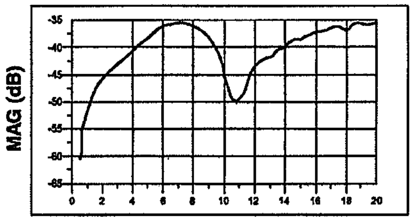
Average MAG S11



MAG (dB)
0.0
-0.5
-1.0
-1.5
-2.0
0 2 4 6 8 10 12 14 16 18 20

Freq. GHz

Average MAG S21



MAG (dB)
-35
-40
-45
-50
-55
-60
-65
0 2 4 6 8 10 12 14 16 18 20

Freq. GHz

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

VERTICAL LAYER CAPACITORS

GLOBAL PART NUMBER EXAMPLE (How to Order)

M VL 3030 X 103 M G H 5 N — A

[redacted]

Testing Codes

Presidio Components' quality system is ISO 9001 compliant and approved to Mil-I-45208 and Mil-Std-790

Code	Description
M	**Industrial Rating; FIT Calculation Using 85°C Continuous Operating Temperature** **Electrical:** 100% capacitance, AQL Level II 1% per ANSI/ASQ Z1.4 for insulation resistance (IR) and dielectric withstanding voltage (DWV) **Visual:** 100%, as per Mil-Std-883, Method 2032. Can be upgraded to Test Code H as per Mil-PRF-38534
H	Class H Element evaluation as per Mil-PRF-38534, Appendix C, Table C-III
	High Reliability Testing **(Industrial part numbers cannot be upgraded)**
K	Class K Element evaluation as per Mil-PRF-38534, Appendix C, Table C-III

Capacitance (Industrial Rating)

Dielectric Material	Temperature Coefficient	D.W. VDC	Working VDC	Cap. Value (pF)	Size 2020	Size 3030	Size 4040	Size 3080	Size 4080
[redacted]									

Dimensions INCHES

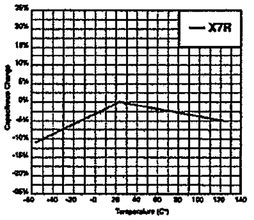
Size	L	W	T max	MB max
[redacted]				

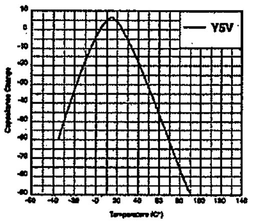
MILLIMETERS (for reference only)

Size	L	W	T max	MB max
[redacted]				

Dielectric Material Codes and Electrical Specifications

Material	X7R	Y5V
Code:	X	Y
Dissipation Factor:	4.0% max.	12.5% max.
Insulation Resistance at 25°C:	> 10⁵ MΩ	> 10⁵ MΩ
Dielectric Withstanding Voltage:	2.5 times WVDC	2.5 times WVDC
Working Voltage:	See Capacitance Table	16 VDC
Temperature Coefficient over Operating Temp.:	± 15%	+22%, -82%
Operating Temperature:	-55°C to +125°C	-30°C to +85°C
Aging Rate:	2.5% max per decade/hour	5% per decade/hour
RoHS Compliant		YES





Capacitance Codes

First Two Digits = Significant figures of capacitance in picofarads
Third Digit = Additional number of zeros
Example: 100 = 10 pF
102 = 1,000 pF
104 = 100,000 pF

Termination

Code	Description
H	99.99% Au

For conductive epoxy die attach only

Packaging

5 = Waffle Pack (standard)

Environmental Parameters Per Mil-PRF-49464/55681 (when specified)

	Mil-Std-202	Conditions
Immersion	104	B
Moisture Resistance	106	-
Resistance to Solder Heat	210	C
Thermal Shock	107	A
100 Hour Voltage Conditioning	108	A
2000 Hour Life Test	108	A
Low Voltage Humidity	103	A

Capacitance Tolerance

Code	Tol.
M	± 20%
Z	-20%, +80%

Working Voltage

Code	WVDC	Code	WVDC
3	100	1	25
2	50	G	16

Mechanical Parameters

Bond Strength	Mil-Std-883, Method 2011
Shear Strength	Mil-Std-883, Method 2019
Metalization Thickness	100 microinches (2.5 micrometers)

RoHS

Code	Compliant
N	No
R	Yes

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

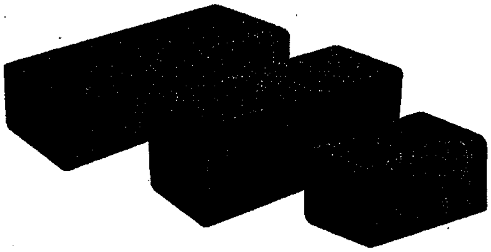
BURIED BROADBAND™ CAPACITORS

For DC Blocking up to 100 GHz

PRESIDIO ADVANTAGE

KEY FEATURES

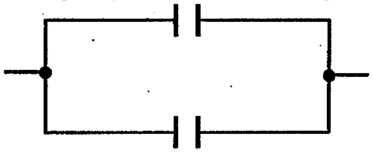
- -0.2 dB insertion loss at 10 GHz (OC192)
- Resonant free at critical 1.6 to 1.8 GHz
- ± 15% capacitance change over temperature
- Patented integration of high and low frequency capacitors
- Free equivalent circuit capacitor model for easy design
- Sizes 0805, 0603, 0502, and 0302
- Rugged monolithic body for easy pick and place



KEY APPLICATIONS

- Broadband DC Blocking Up to 100 GHz
- OC192, OC768 Transponders and Transceivers
- Broadband Microwave
- Broadband Test Equipment

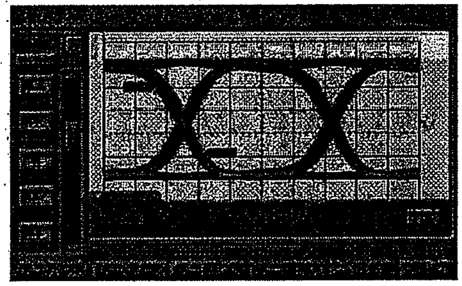
Single Layer Capacitor: GHz Range



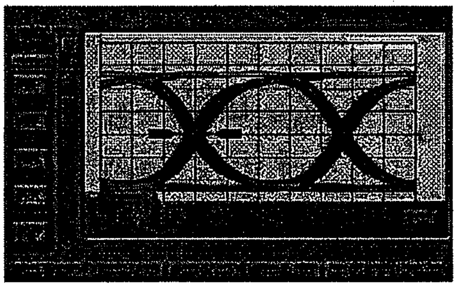
Multilayer Capacitor: kHz-MHz Range

EYE DIAGRAM COMPARISON

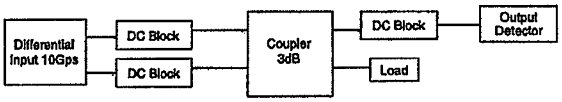
Presidio Components, Inc.
MBB0502X104MGP DC Block



Generic MLC
0402 X7R100nF DC Block



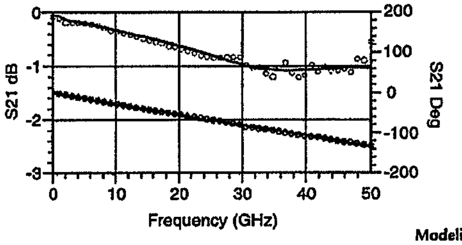
Test Setup

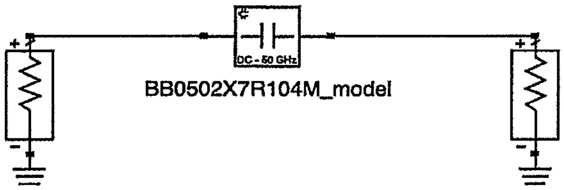

Differential Input 10Gps
DC Block
DC Block
Coupler 3dB
DC Block
Load
Output Detector

Courtesy of Phyworks

FREE MODEL DOWNLOAD

MODEL TO MEASUREMENT COMPARISON


S21 dB
0
-1
-2
-3
S21 Deg
200
100
0
-100
-200
0
10
20
30
40
50
Frequency (GHz)


DC - 50 GHz
BB0502X7R104M_model

Modeling services by Modelithics

www.presidiocomponents.com/BB/index.htm

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 26

BURIED BROADBAND™ CAPACITORS

QUICK SELECT BY APPLICATION AND RESONANT FREE BANDWIDTH

Size	Resonant Free Bandwidth**	Typical Insertion Loss (S21)***	2 Cap. Values in parallel (pF)	Temp. Coeff.	Working VDC	FIT Calc. using cont. op. temp. @	Global Part Numbers
Fiber Optic							
0502	16 kHz to 40 GHz	-0.2 dB at 10 GHz	100,000 & 82	± 15%	16 VDC	85°C	MBB0502X104MG___ N8_*
0502	16 kHz to 40 GHz	-0.2 dB at 10 GHz	100,000 & 82	± 15%	20 VDC	65°C	LBB0502X104MH___ N8_*
0603	[illegible] kHz to 20 GHz	-0.45 dB at 10 GHz	150,000 & 220	± 15%	16 VDC	85°C	MBB0603X154MG___ N2_*
0805	[illegible] kHz to 20 GHz	-0.5 dB at 10 GHz	150,000 & 220	± 15%	16 VDC	85°C	MBB0805X154MG___ N2_*
0805	[illegible] kHz to 20 GHz	-0.6 dB at 10 GHz	56,000 & 220	± 15%	75 VDC	85°C	MBB0805X563ML___ N2_*
Microwave							
0502	160 kHz to 40 GHz	-0.3 dB at 10 GHz	10,000 & 82	± 15%	75 VDC	85°C	MBB0502X103ML___ N8_*
0603	[illegible] kHz to 30 GHz	-0.5 dB at 10 GHz	4,000 & 220	± 15%	50 VDC	85°C	MBB0603X402M2___ N2_*
0805	[illegible] kHz to 20 GHz	-0.5 dB at 10 GHz	4,000 & 220	± 15%	50 VDC	85°C	MBB0805X402M2___ N2_*
Test Instruments							
0302	160 kHz to 100 GHz	-1.2 dB at 100 GHz	12,000 & 82	± 15%	16 VDC	85°C	MBB0302X123MG___ N8_*
High Reliability Space							
0502	[illegible] kHz to 40 GHz	-0.35 dB at 10 GHz	10,000 & 82	± 15%	12 VDC	100°C	SBB0502X103MF___ N8_*
RoHS Compliant							
0502	16 kHz to 40 GHz	-0.2 dB at 10 GHz	100,000 & 82	± 15%	16 VDC	85°C	MBB0502X104MG___ R8_*
0502	16 kHz to 40 GHz	-0.2 dB at 10 GHz	100,000 & 82	± 15%	20 VDC	65°C	LBB0502X104MH___ R8_*
0502	24 kHz to 40 GHz	-0.2 dB at 10 GHz	68,000 & 82	± 15%	16 VDC	85°C	MBB0502B683MG___ R8_*
0502	24 kHz to 40 GHz	-0.2 dB at 10 GHz	68,000 & 82	± 15%	20 VDC	65°C	LBB0502B683MH___ R8_*

* Insert codes for Termination, Packaging, and Design-In Code (see pages 13 and 16)
** -3.0 dB low frequency point
*** Average de-embedded data

Consult Factory for Higher Voltage Ratings

RECOMMENDED MOUNTING METHODS

PC Board Observations

(a) Soft or hard substrates (alumina) are typically used at microwave frequencies. For lowest reflection loss fused silica substrates are recommended at millimeterwave frequencies.

(b) Microstrip line width should match or come close to capacitor width to optimize capacitor performance. Fanning out the microstrip line to match the capacitor width may degrade capacitor loss at millimeterwave frequencies.

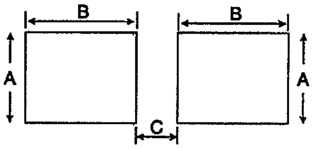
Microstrip Line Gap

Option 1: 0.015" to 0.010" (.381 mm to .254 mm) microstrip line gap for broadband performance at microwave frequencies (example 16 kHz to 10 GHz).

Option 2: 0.005" to 0.002" (0.127 mm to 0.051 mm) microstrip line gap for very broadband performance at millimeterwave frequencies (example 16 kHz to 40 GHz +).

Mounting Pad Dimensions (general recommendation*)

Case Size	INCHES A min	INCHES B min	INCHES C min*	MILLIMETERS A min	MILLIMETERS B min	MILLIMETERS C min*
0302	0.020	0.015	0.003	0.508	0.381	0.076
0502	0.020	0.025	0.010	0.508	0.635	0.254
0603	0.030	0.030	0.015	0.762	0.762	0.381
0805	0.060	0.040	0.020	1.524	1.016	0.508



Centerline of the capacitor should be located in the center of the gap in the microstrip line.

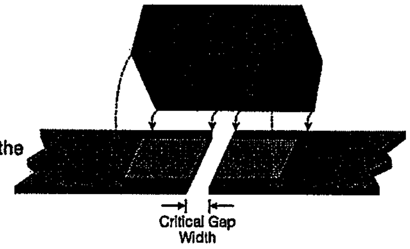
*Disclaimer: Gap dimension, substrate material and microstrip line width impact circuit performance. Consult factory for application specific recommendations.

Recommended Attachment to Substrate

(a) Solder Attach (wave reflow, vapor phase or convection tunnel oven). See termination codes for guidelines.

(b) Conductive Epoxy

It is recommended that both mounting pads be bonded simultaneously and that the pre-heat, soldering or curing, and post-heat temperatures be controlled.



PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

GLOBAL PART NUMBER EXAMPLE (How to Order)

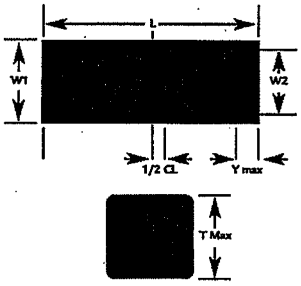
M BB 0502 X 104 M G P 5 R 8 A

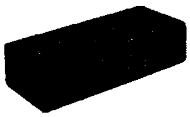
- M — Test
- BB — Product Code
- 0502 — Size
- X — Dielectric Material
- 104 — Capacitance
- M — Capacitance Tolerance
- G — Working Voltage (WVDC)
- P — Termination
- 5 — Packaging
- R — RoHS Code
- 8 — Special Code 2nd Cap Value
- A — Design Code [illegible]

Testing Codes Presidio Components' quality system is ISO 9001 compliant and approved to Mil-I-45208 and Mil-Std-790

Code	Description
L	**Industrial Rating; FIT Calculation Using 65°C Continuous Operating Temperature** **Electrical:** 100% capacitance, AQL Level II 1% per ANSI/ASQ Z1.4 for insulation resistance (IR) & dielectric withstanding voltage (DWV) **Visual:** 100%, as per Mil-Std-883, Method 2032
M	**Industrial Rating; FIT Calculation Using 85°C Continuous Operating Temperature** **Electrical:** 100% capacitance, AQL Level II 1% per ANSI/ASQ Z1.4 for insulation resistance (IR) & dielectric withstanding voltage (DWV) **Visual:** 100%, as per Mil-Std-883, Method 2032
S	**High Reliability "SR" Capacitors** Please check "SR" test designation on Presidio's website under "Test Capability"

Size	Ceramic Body Length L	Ceramic Body Width W 1	Ceramic Body Height T max.	Band Y max.	1/2 Gap Between Surface Pads CL	Surface Pad Width W2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MILLIMETERS (reference only)						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

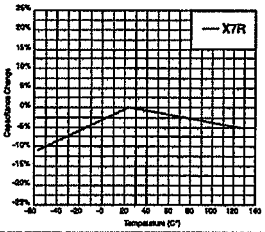




* This dimension applies only to MBB0805X402M2__ __ N2__

Dielectric Material Code & Electrical Specification

Material	X7R	BX
Code:	X	B
Dissipation Factor:	4.0% max.	4.0% max.
Insulation Resistance at 25°C:	> 10^5 MΩ	> 10^5 MΩ
Dielectric Withstanding Voltage:	2.5 x WVDC	2.5 x WVDC
Working Voltage (WVDC)	See Part Numbers	See Part Numbers
Temperature Coefficient over Operating Temp.:	± 15%	± 15%
Operating Temperature:	-55°C to +125°C	-55°C to +125°C
Aging Rate:	2.5% max per decade/hour	2.5% max per decade/hour



Capacitance Codes for Multilayer Capacitor

First Two Digits = Significant figures of capacitance in picofarads
Third Digit = Additional number of zeros
Example:
100 = 10 pF
102 = 1,000 pF
104 = 100,000 pF

Termination Codes

Code	RoHS Comp.	Typical Application	Termination Build up	Recommended Reflow Temp.
T	Yes	Solder Reflow	Palladium-Silver Nickel Barrier Plated 100% Tin	220°C to 260°C typical*
N	No	Solder Reflow by IR, vapor phase, wave, convection tunnel oven	Palladium-Silver Nickel Barrier Plated 90/10 Tin Lead	220°C to 260°C typical*
P	Yes	Conductive Epoxy Non-Magnetic	Palladium-Silver	Cure Epoxy as per manufacturer's spec.
G	Yes	Conductive Epoxy, Wire Bondable	Palladium-Silver Nickel Barrier 100 µ" thick Gold typical	Cure Epoxy as per manufacturer's spec.

***Typical temperature guidelines for solder attachment:**
Reflow: Preheating — 2°C/second up to 100 seconds
Soldering — 220°C to 260°C for 20 to 60 seconds
Gradual Cooling: Exit less than 100°C

Standard Capacitance Tolerance

Code	Tolerance
M	± 20%

Working Voltage

Code	WVDC
F	12
G	16
H	20
1	25
2	50
L	75

Packaging Codes

1 = Tape and Reel
5 = Waffle Pack

RoHS

Code	Compliant
R	Yes
N	No

Environmental Parameters

Per Mil-PRF-49464/55681 (when specified)	Mil-Std-202 Method	Condition
Thermal Shock and Immersion	107	A
Resistance to Soldering Heat	210	C
Low Voltage Humidity	103	A

Mechanical Parameters

Terminal Strength 2 lbs typical

Special Codes for Second Capacitor Value

Code	Nominal Capacitance
8	82 pF
2	220 pF

PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 28

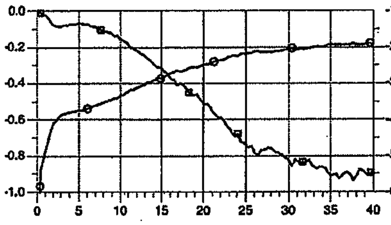
SELECTED PERFORMANCE DATA

Disclaimer: The results are only valid as per described test set up. Other configurations will lead to different results.

Global Part Number: MBB0502X104MGP5N8_*_

Evaluated on .010" thick fused silica substrate. Line width .023", gap width .005", transmission line effects and capacitance to ground removed.

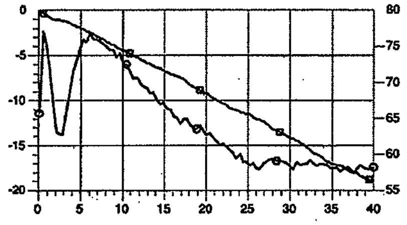
Transmission and Return Loss (S21, S11)


0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-10
-20
-30
-40
-50
-60
0 5 10 15 20 25 30 35 40

Frequency (GHz)

S21= Red Line with Squares
S11= Blue Line with Circles

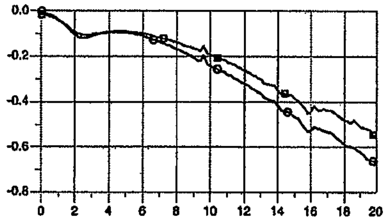
Phase (Degree) (S21, S11)


0
-5
-10
-15
-20
80
75
70
65
60
55
0 5 10 15 20 25 30 35 40

Frequency (GHz)

S21= Red Line with Squares
S11= Blue Line with Circles

Transmission Loss over Temperature (S21)


0.0
-0.2
-0.4
-0.6
-0.8
0 2 4 6 8 10 12 14 16 18 20

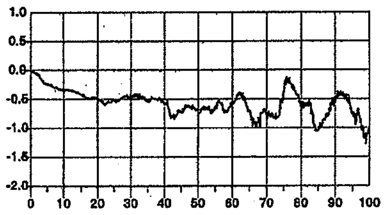
Frequency (GHz)

+25°C = Red Line with Squares
+85°C = Blue Line with Circles

Global Part Number: MBB0302X123MGP5N8_*_ Tested up to 100 GHz (courtesy of Agilent Technologies)

Evaluated on .010" thick fused silica substrate (11 mm long) in a 1 mm coaxial fixture. Line width .020", gap width .002".

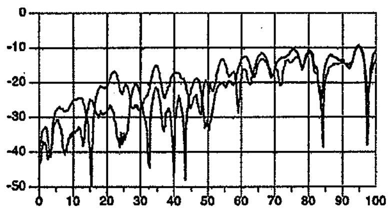
Transmission Loss (S21)


1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0 10 20 30 40 50 60 70 80 90 100

Frequency (GHz)

Thruline and 1 mm connector loss removed

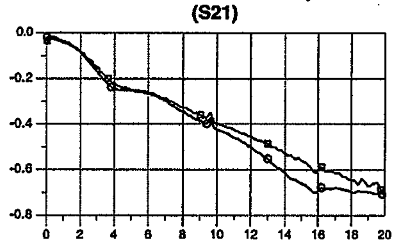
Return Loss (S11)


0
-10
-20
-30
-40
-50
0 10 20 30 40 50 60 70 80 90 100

Frequency (GHz)

1 mm connector loss not removed
Blue Line = 11 mm thruline
Red Line = Presidio 0302_X7R_10nf

Transmission Loss over Temperature (S21)


0.0
-0.2
-0.4
-0.6
-0.8
0 2 4 6 8 10 12 14 16 18 20

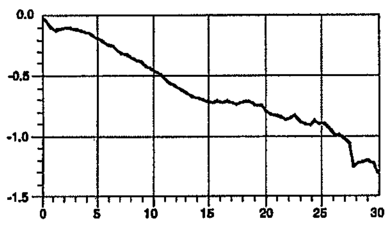
Frequency (GHz)

+25°C = Red Line with Squares
+85°C = Blue Line with Circles

Global Part Number: MBB0603X402M2P5N_*_

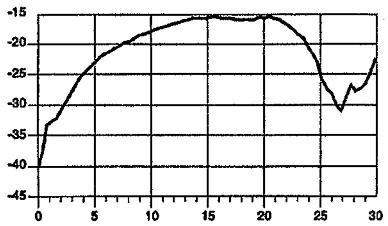
Evaluated on a .004" thick Rogers 4003 substrate (Er=3.38), transmission line effects and capacitance to ground removed.

Transmission Loss (S21)


0.0
-0.5
-1.0
-1.5
0 5 10 15 20 25 30

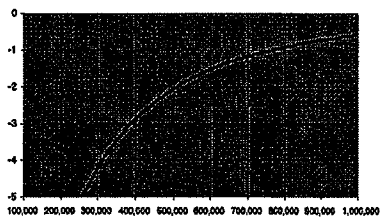
Frequency (GHz)

Return Loss (S11)


-15
-20
-25
-30
-35
-40
-45
0 5 10 15 20 25 30

Frequency (GHz)

Low Frequency Modeled Loss (S21)



Frequency (Hz)

4nF

*Insert Design-In Code (See page 16)

PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

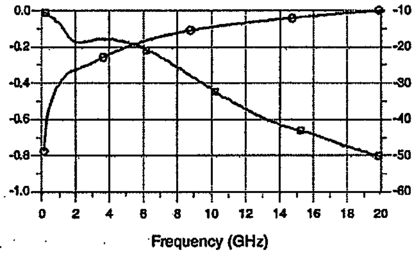
SELECTED PERFORMANCE DATA

Disclaimer: The results are only valid as per described test set up. Other configurations will lead to different results.

Global Part Number: MBB0603X154MGP5N2_*_

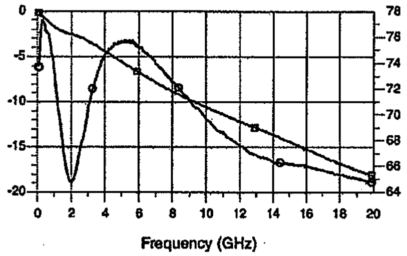
Evaluated on .008" thick Rogers 4003 (Er = 3.38) substrate. Line width .017", pad width .038", gap width .022", transmission line effects and capacitance to ground removed.

Transmission and Return Loss (S21, S11)



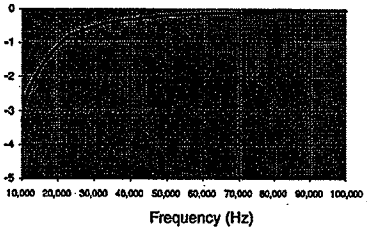
S21= Red Line with Squares
S11= Blue Line with Circles

Phase (Degree) (S21, S11)



S21= Red Line with Squares
S11= Blue Line with Circles

Low Frequency Modeled Loss (S21)

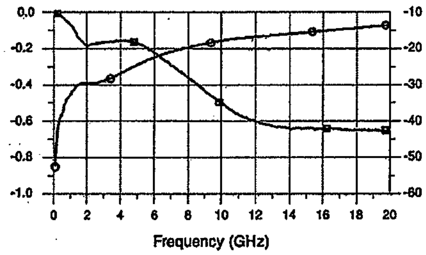


150nF

Global Part Number: MBB0805X154MGP5N2_*_

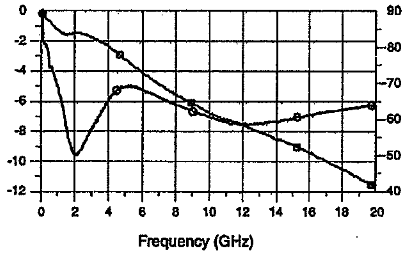
Evaluated on .008" thick Rogers 4003 (Er = 3.38) substrate. Line width .017", pad width .038", gap width .022", transmission line effects and capacitance to ground removed.

Transmission and Return Loss (S21, S11)



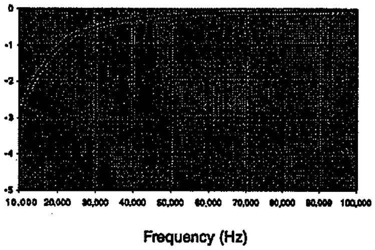
S21= Red Line with Squares
S11= Blue Line with Circles

Phase (Degree) (S21, S11)



S21= Red Line with Squares
S11= Blue Line with Circles

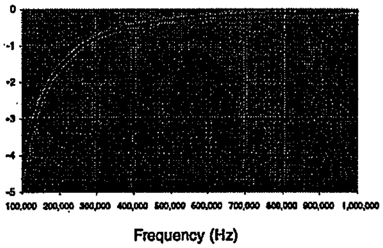
Low Frequency Modeled Loss (S21)



150nF

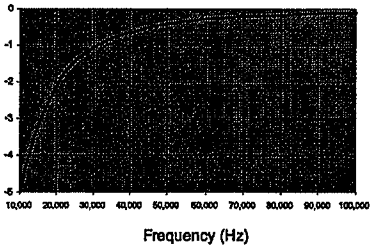
LOW FREQUENCY MODELED LOSS (S21)

MBB0302X123MGP5N8_*_



12nF

MBB0502X104MGP5N8_*_



100nF

*Insert Design-In Code (See page 16)

BURIED BROADBAND™ CAPACITORS

PRESIDIO COMPONENTS, INC.
7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 30

PRESIDIO COMPONENTS' NEW GLOBAL PART NUMBERS

GLOBAL PART NUMBERS:

Thank you for considering Presidio Components. This brochure includes Presidio's new Global (shortened) part numbers. The Global part numbers are used by customers whose computer systems cannot handle our Manufacturing (longer) part numbers.

If you ordered parts from us in the past with a Manufacturing number, that number is still valid. However, if you would like to convert to our new Global part numbers, simply go to our website. A tool has been added to the site to assist in the conversion between Manufacturing and Global part numbers.

A WORD TO THE DESIGN ENGINEER:

After the design work is done, outsourcing manufacturing on a global basis is a management option. At Presidio Components, we are striving for complete customer satisfaction which includes "after" service.

We created our new Global part numbers with a "Design In" locator code for quick traceability, if needed. Please select your location from the table below and add the appropriate code at the end of the part number. If you need assistance give us a call at (858) 578-9390 or email us at info@presidiocomponents.com.

UNITED STATES

USA	Code	USA	Code
Alabama	G	Nebraska	P
[illegible]	[illegible]	Nevada, North	B
Arizona	[illegible]	Nevada, South	C
Arkansas	[illegible]	New Hampshire	L
California, North	[illegible]	New Jersey	J
California, South	[illegible]	New Mexico	D
Colorado	E	New York, Metro	J
Connecticut	L	New York, Upstate	K
Delaware	I	North Carolina	[illegible]
District of Columbia	H	North Dakota	[illegible]
Florida	[illegible]	Ohio	[illegible]
Georgia	G	Oklahoma	[illegible]
Hawaii	P	Oregon	[illegible]
Idaho	[illegible]	Pennsylvania	[illegible]
Illinois	[illegible]	Rhode Island	L
Indiana	[illegible]	South Carolina	G
Iowa	[illegible]	South Dakota	O
Kansas	[illegible]	Tennessee	G
Kentucky	M	Texas	F
Louisiana	P	Utah	E
Maine	L	Vermont	L
Maryland	H	Virginia	H
Massachusetts	L	Washington	A
Michigan	N	West Virginia	P
Minnesota	O	Wisconsin, East	N
Mississippi	[illegible]	Wisconsin, West	O
Missouri	N	Wyoming	E
Montana	A		

OUTSIDE THE UNITED STATES

Americas	Code
Canada	R
Mexico	R
Caribbean	[illegible]
Central America	[illegible]
South America	[illegible]

Pacific Rim	Code
Australia	[illegible]
China	[illegible]
Japan	[illegible]
Korea, South	[illegible]
Malaysia	W
Singapore	X
Other Pacific Rim Countries	Y

Europe	Code
Austria	3
Belgium	1
Denmark	5
Finland	5
France	2
Germany	3
Ireland	6
Italy	4
Luxembourg	1
Netherlands	1
Norway	5
Sweden	5
Switzerland	3
United Kingdom	6
Other European Countries	7

Other	Code
India	[illegible]
Israel	8
Rest of World	9

CHECK PRESIDIO'S WEBSITE FOR THE LATEST CATALOG REVISION

Catalog 6000
Rev. E

Patent Numbers
6,366,443 6,751,082 6,917,509
6,542,352 6,753,218 6,970,341
6,587,327 6,816,356 7,075,776
OTHER PATENTS PENDING

PRESIDIO COMPONENTS, INC.

7169 Construction Court, San Diego, CA 92121 • Tel: 858-578-9390 • Fax: 800-538-3880 or 858-578-6225
www.presidiocomponents.com • info@presidiocomponents.com

EXHIBIT F
Page 31